

## Emergency call system within a telecommunication network

This application is a continuation of international application PCT/CH99/00401 filed on August 30, 1999.

### Field of the invention

- 5       The present invention concerns an emergency call system that can be used within a telecommunication network.

### Related Art

- 10       Patent application GB-A-2250400 (D. Brown McDougall) describes a system for automatically communicating in an emergency a predefined message to a predefined telephone number list in a predetermined sequence. This system is suited for example in the case of burglary or fire for calling first selected neighbors and then the police or the fire brigade. Fast assistance from various partners can thus be achieved.

- 15       Such a system is however hardly suitable for giving assistance to mobile users in an emergency, since the called partners cannot know where the calling mobile user is currently located and where help is needed.

It is an aim of the invention to propose a method for distributing emergency call messages that is better suited for mobile users.

- 20       Patent application WO98/31168 describes a system for automatically determining the location of a mobile user notifying a central of an emergency. Further emergency call messages from other mobile users in the vicinity are then no longer forwarded directly to the central in order not to overload it. The mobile user in an emergency can however not expect very fast assistance from this system, since the emergency call  
25       message is forwarded only to a generally distant central.

It is another aim of the invention to propose a method with which mobile users in an emergency can receive faster assistance.

It is another aim of the invention to propose a method with which emergency call messages can be distributed fast and without high connection costs to better selected terminals.

### Brief Summary of the Invention

According to the present invention, these aims are achieved in particular through the characteristics of the independent claims. Further advantageous embodiments are moreover described in the dependent claims and in the description.

In particular, these aims are achieved in that an emergency call message generated by a mobile user is automatically sent first to mobile devices in the vicinity of the mobile user, and then distributed to terminals, predefined by said user, in the telecommunication network.

This has the advantage that the emergency call message is first sent to mobile users in the immediate vicinity of the mobile user and who can thus give the fastest assistance. Only later is the emergency call message (possibly) distributed to other terminals predefined by the mobile user, for example to his family, to friends, to the police, etc.

In a preferred embodiment of the invention, the emergency call message is sent as SMS (Short Message System) or USSD (Unstructured Supplementary Services Data) message. This has the advantage that an emergency call message can be sent free of charge or at a low cost almost simultaneously to many users, even when the user may telephone only up to a certain amount, for example in the case of a prepaid card.

In a preferred embodiment of the invention, the emergency call message is distributed to terminals located progressively further away from

the mobile user. This has the advantage that more distant users are only disturbed if no closer user has reacted.

In a preferred embodiment of the invention, the emergency call message contains characteristics that enable a faster identification of this user and/or a faster and better help. For example, a description of the mobile user and/or of his vehicle and/or medical features such as blood group, and/or images etc. can be contained in the emergency call message. Preferably, these characteristics are stored in the mobile device, for example in the identification module of the user, and transmitted automatically when an emergency call message is generated. This has the advantage that the mobile user does not have to enter these useful indications himself during an emergency.

In a variant embodiment, the emergency call message contains only a pointer to a memory area in the mobile device or in a server, where these characteristics are stored. In this manner, a mobile user who receives an emergency call message can obtain these characteristics himself if he needs them.

#### Description of the drawings

Hereafter, various embodiments of the invention will be described in more detail with the aid of the attached single figure. The figure shows diagrammatically a system in which an emergency call message is distributed.

#### Detailed Description of the Invention

Although this invention describes in detail the special case of the invention being applied in a GSM mobile radio network 30, the one skilled in the art will understand that this method can also be used with other types of cellular mobile radio networks, for example with AMPS, TDMA, CDMA, TACS, PDC, HSCSD, GPRS, EDGE or UMTS networks.

Reference number 10 shows the mobile terminal of a mobile user finding himself in an emergency. Other mobile terminals in the same mobile radio network 30 bear the reference numbers 12 and 13. The mobile terminals 10, 12, 13 can for example be mobile telephones, media  
 5 telephones, laptops, palmtops or computers with a mobile telecommunication interface. The terminal 10 has an identification module 101, for example a SIM (Subscriber Identification Module) card, with various memory areas 102, 103 preferably integrated in the same chip. In a preferred embodiment, the terminal 10 additionally has a control element  
 10 100 in order to generate very quickly an emergency call message. The control element 100 can be for example a button, or a GUI (Graphical User Interface) element displayed on the screen of the terminal, for example an icon, a menu title, etc.

In a variant embodiment, the terminal 10 can additionally be  
 15 connected with an emergency call detector 104 or be integrated in such a detector respectively contain such a detector. The detector 104 can automatically determine certain emergency situations and request the mobile device 10 to send an emergency call message. Depending on the application, the detector 104 can for example determine burglaries, for  
 20 example in houses or cars, offences against property, fire, loss of consciousness, accidents, traffic congestion on the highway, etc. The detector 104 can for example be an impact shock detector, for example with an acceleration measuring device.

The reference number 14 shows a terminal that can also be  
 25 reached from the mobile network 30. The terminal 14 can for example be a telephone connected to a fixed network, a facsimile machine, a PC, a mobile device, etc. In this invention, the terminal 14 is used by a user whom the mobile user 10 wishes to inform in the case of emergencies. The terminal 14 can for example be used by family, friends, by the police, the  
 30 fire brigade, a hospital, etc.

The number 20 represents a fixed device in the mobile radio network 30. Depending on the embodiment and on the mobile radio

network, the device 20 can be part of a fixed station system, for example a base station, a mobile switching center, for example a MSC (Mobile Switching Service Center), a server in the network, or a combination of these components. The device 20 contains a location-determining system  
 5 21, or can access such a system. The device 20 additionally includes a memory area 200 in which a software program is stored that can be executed by appropriate data processing means.

If the user of the mobile device 10 wants to generate an emergency call message, he preferably needs to operate only the control  
 10 element 100. In a variant embodiment, an emergency call message can automatically be generated on the initiative of the detector 104. In another embodiment, the mobile user generates an emergency call message by manually entering a text and sending it as SMS, USSD, GPRS, etc. to a predefined address. In a further embodiment, the mobile user can send an  
 15 emergency call message by selecting a predefined emergency call number and thus connecting with the server 20 that recognizes the identity of the caller and forwards the emergency call message.

In the memory area 102 of the mobile device, for example in the identification module 101, at least one characteristic of the mobile user is  
 20 stored. This or these characteristics can for example allow a faster identification of the mobile user and/or a faster and more efficient help. In a first variant embodiment, these characteristics have been entered and stored by said mobile user himself. In another variant embodiment, they have been downloaded by a third party, for example by the network  
 25 operator and/or by a service provider, for example a doctor or an insurance company, over the network 30, for example on the basis of the SICAP method described in patent EP0689368. In yet another variant embodiment, they have been downloaded from an external device over a contactless interface at close range, for example over a Bluetooth or IrDA  
 30 interface. Various characteristics in the same memory area 102 can also be loaded over various channels in the memory area 102.

Depending on the application and on the wish of the mobile user 10, the characteristics stored in the memory area 102 can comprise for example among others the mobile user's name, his blood group, his gender, his hair color, his age, his car type, color and plate number, etc. In a variant embodiment, these characteristics can also include an image of the mobile user and/or of his car. These characteristics are then linked with the emergency call message. In a variant embodiment, the emergency call message contains only a pointer, for example a URL address, to these characteristics; users who receive the emergency call message can then with this pointer access the required characteristics. In this case, at least certain characteristics are stored in a server rather than in the mobile device.

As already mentioned, and depending on the mobile radio network 30, the emergency call message can be transmitted, as SMS or USSD message, as GPRS packet, as e-mail, for example within a WAP (Wireless Application Protocol) system, etc. Preferably, a free or at least inexpensive mode of transmission is used, so that an emergency call message can even be sent to many users if the prepaid credit of the mobile user is exhausted or nearly exhausted. Facsimile messages or spoken messages, preferably messages generated with a voice synthesizer, can however also be used in the framework of this invention.

Preferably, the identification card 101 of the mobile user is programmed to also send costly emergency call messages when the mobile user's credit has been completely exhausted. Such an identification card is described in utility patent DE-U-29800711.8.

The personal identification module 101 preferably contains an electronic certificate with which emergency call messages can be signed electronically, so that each recipient 20, 12, 13, 14 can verify the sender's identity. Additionally, at least certain confidential data in the emergency call message are preferably encrypted electronically so that only authorized recipients can decrypt these confidential data. For example, medical characteristics of the user are encrypted with a public key so that only

authorized doctors who have the matching private key can access these data.

The emergency call message sent by the user 10 is sent over the mobile radio network 30 to the device 20 (arrow 1), that possibly completes  
 5 this message, for example with additional user characteristics, and forwards it first to other mobile devices 12, 13 in the vicinity of the mobile user 10 (arrow 2). The emergency call message can also be converted in the device 20 into a message of another type. For example, a SMS message can be converted into an e-mail, a fax or a voice message generated with a voice  
 10 synthesizer. It is also possible to carry out several type-conversions of the same message, so that the emergency call message can be distributed to as many terminals 12, 13, 14 of different types as possible.

In a first variant embodiment of the invention, the emergency call message is sent simultaneously to all mobile devices 12, 13 that use the  
 15 same base station as said mobile user 10.

In another variant embodiment of the invention, the position of the calling mobile user 10 is determined by the location-determining system 21. The location-determining system 21 can determine this position for example from trigonometric computations of signals from a plurality of  
 20 base stations. The user's position can however also be determined by the mobile device 10, for example with a GPS (Global Positioning System) receiver, and be communicated to the system 21 as part of the emergency call message 1. The emergency call message is first distributed on the basis of the position indication determined by the location-determining system  
 25 21 to all mobile users 10, 12, 13 in the vicinity. For example, the emergency call message can be directed first only to the mobile devices 12 that are close to the mobile user 11, and then only in a further step distributed to the more distant devices 13. In this manner, the emergency call message is distributed to mobile devices 12, 13 that are progressively further away  
 30 from the mobile user.

The user of a mobile device 12 or 13 that has received the emergency call message can send a confirmation to the mobile user 10 and/or to the device 20 and thus declare his readiness to give assistance. The emergency call message is preferably only distributed any further until a mobile device 12, 13 has dispatched such a confirmation. Depending on the embodiment and on the kind of emergency message, the message can be distributed until for example a doctor or policeman identified as such has declared his readiness.

When all active users within a defined area, for example within a cell in the mobile radio network 30, have been reached without success, the geographic distribution of the emergency call message is interrupted. According to the invention, the emergency call message is then sent to terminals 14 predefined by said user 10.

For this purpose, the mobile user 10 can define a list of terminals 14 to which unanswered emergency messages must be addressed. This list can comprise for example the telephone numbers or e-mail addresses of friends, of the family doctor, of the police, etc. Preferably, the emergency call address list is stored in a memory area 103 of the mobile device 10, for example in the identification module 101. The list can for example consist of a subset of the personal phone number directory stored in the identification module 101. In a variant embodiment, the emergency call address list is however rather stored in a memory area accessible from a mobile switching center (MSC) in the telecommunication network 30, for example in the home data (HLR). The list is preferably encrypted so that only authorized persons can have access to it.

The emergency call messages can be forwarded to all the terminals in the list (arrow 4). In a variant embodiment, the mobile user can organize the terminals 14 in the list hierarchically. The emergency call message is in this case first sent to terminals having the highest level in this hierarchy and progressively to terminals on lower levels. The distribution stops for example when a called user 14 answers or sends a confirmation.



The mobile user 11 can preferably himself define which addresses he wants to enter in said emergency call address list 103. New addresses can for example be entered with input means of the mobile device, over the Internet and/or over an external device at close range connected with the mobile device 11 over a contactless interface. Preferably, authorized external third parties can enter addresses in the emergency call address list 103, for example selected doctors, car repair firms, etc. This list can also be updated and/or completed dynamically, for example according to the current location of the mobile user 11.

In the framework of this invention, it is also possible to store in a single terminal several emergency call address lists 103 that can correspond to different emergency situations. For example, a car driver can define that in the case of a congestion on the highway, first the neighboring cars and then the police must be informed, whilst in the case of an accident, also the family and the family doctor must receive an emergency message. Time- and location-dependent emergency call address lists can also be defined in the framework of this invention.

Addresses in the emergency call address list can preferably correspond to different types of terminals that can be reached through various other networks. For example, the addresses defined by the user can correspond to other mobile devices, for example GSM mobile telephones, fixed network devices, e-mail addresses and/or fax recipients. In this case, a conversion of the message type takes place in the system part 20.

If the mobile user 11 who has sent an emergency call message 1 continues moving, his location is preferably further monitored by the location-determining system 21. The emergency call message in this case is distributed to other mobile devices in the new vicinity of the mobile user. Thus, the distribution area of the emergency call message automatically follows the moving mobile user. This characteristic can for example be useful in the case of abduction or offences against property.